

INFORMATION REPORT

CENTRAL INTELLIGENCE

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N O F O R E I G N D I S S E M I N A T I O N

COUNTRYYugoslavia

REPORT

SUBJECT1. Semipassive Repeaters for Radio Bridges
2. Transistorized Circuits for Ionization Chambers

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THIS IS UNEVALUATED INFORMATION.

reports,

entitled (1) Semipassive Repeaters for Radio Bridges, and (2) Transistorized Circuits for Ionization Chambers.

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SUBJ: Transistorized Circuits for Ionization Chambers

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1. It is noted that transistor circuits always show an impedance in an input which is not high; with special transistors, with a low base current, it is possible, under determined conditions, to reach the $10^6 - 10^7$ ohm level. The transistors do not lend themselves, however, to compose the input stage of amplifiers or electrometers for ionization chambers. A general application would be very interesting, on the other hand, especially insofar as it pertains to monitoring apparatus for radiological defense which must be, obviously, very sturdy (anticollision, etc.)

2. The physicists at Vinca [the Boris Kidric Institute of Nuclear Sciences] have measured in detail a suitable circuit in this range. The input stage (connected to the chamber) is composed of a "balanced modulator with diodes" (as diodes are used for the base/collector junctions of silicon transistors), of which ~~the output~~, amplified and detected in phase, emerges as the autobalance. For balancing, the impedance at the entrance of the balance modulator (which is the diagonal of the bridge) is theoretically infinite; in order for a signal to emerge it is obviously necessary for the balance modulator (that is the bridge) to be balanced, if only slightly; if the amplification introduced between the balance modulator and the phase detector is high, it is sufficient that the balancing be minimum; the input impedance remains elevated, however.

3. With a coil gain of 10^4 , the input impedance is 10^{12} ohms, amply sufficient, therefore, for an ionization chamber.

4. The balance modulator is made to function at 500 kcs and, for the best signal/interference ratio, the amplification is selective on this frequency. Because the capacity in the gap is extremely small (in parallel at the balance modulator 10 pF) the velocity of the response of the device is remarkable and by far superior to that obtainable with electrometrical tubes.

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June 1962.

The apparatus was tested in

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Comment: This appears to be an original and very interesting discovery, above all in view of the application already mentioned, that is for devices for ~~the~~ radiological monitoring in the field. The value of the circuit is, above all, the integral employment of transistors and the exclusion of electrometrical tubes, then the rapidity of response which does not make its use particularly simple and fast.

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SUBJ: Semipassive Repeaters for Radio Bridges

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1. That which distinguishes passive repeaters (made up of single directional dipoles, picking up and emitting, interconnected without the interpositioning of other amplifying elements) and semipassive repeaters, in which there is a "regeneration" of the signal by the diode tunnel effect, with a gain in power, is as follows: the passive repeater is characterized by a sensitive worsening of the signal/interference ratio and its practical utilization is therefore reduced; the semipassive repeater, on the other hand, is characterized above all by a gain in power that is about 10 db at 200 mcs by which the worsening of the signal/interference ratio is amply compensated. In general, with the tunnel diodes [redacted] used by the Yugoslavs, the noise factor itself is about 4 - 5 db at 200 mcs, by which the "real" worsening of the system always appears greater in the unit.

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2. The value of the system is also the fact that the tunnel diode can be inserted directly into the dipole without the interpositioning of lines or oscillating circuits requiring the adaptation of impedance and without loss. By such means the "repeater" may also be composed of a single dipole (in which is inserted the tunnel diode), assuming together the function of "pick up" and "emitter" of the amplified signal.

[redacted] Comment. The system is technically very interesting and probably worth the extensive research. The name "semipassive" is not completely accurate: in reality this is an "active" repeater whose amplifying elements however have been reduced to a minimum and unified on the same dipole.

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